Appl. No. 10/661,317
Atty. Docket No. 9033
Amdt. dated November 16, 2005
Reply to Office Action of October 24, 2005
Customer No. 27752

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1.) (original) A polymer system comprising:

A.) an anionic polymer selected from the group consisting of

(i) anionic polymers comprising;

a.) a first moiety derived from monoethylenically unsaturated C_3-C_8 monomers comprising at least one carboxylic acid group, salts of such monomers, and mixtures thereof; and

b.) a second moiety selected from the group consisting of:

(1) moieties derived from modified unsaturated monomers having the formulae R – Y – L and R – Z wherein:

i.) R is selected from the group consisting of $C(X)H=C(R^1)$- wherein R^1 is H, or C_1-C_4 alkyl; and

X is H, CO_2H, or CO_2R_2 wherein R_2 is hydrogen, alkali metals, alkaline earth metals, ammonium and amine bases, saturated C_1-C_{20} alkyl, C_6-C_{12} aryl, and C_7-C_{20} alkylaryl;

ii.) Y is selected from the group consisting of $-CH_2-$, $-CO_2-$, -OCO-, and $-CON(R^a)-$, $-CH_2OCO-$; wherein R^a is H or C_1-C_4 alkyl;

iii.) L is selected from the group consisting of hydrogen, alkali metals, alkaline earth metals, ammonium and amine bases, saturated C_1-C_{20} alkyl, C_6-C_{12} aryl, and C_7-C_{20} alkylaryl; and

iv.) Z is selected from the group consisting of C_6-C_{12} aryl and C_7-C_{12} arylalkyl; and

(2) moieties having the formula J–G–D wherein:

i.) J is selected from the group consisting of $C(X)H=C(R_1)$- wherein R_1 is H, or C_1-C_4 alkyl; X is H, CO_2H, or CO_2R_2 wherein R_2 is hydrogen, alkali metals, alkaline earth metals, ammonium and amine bases, saturated C_2-C_{20} alkyl, C_6-C_{12} aryl, C_7-C_{20} alkylaryl;

ii.) G is selected from the group consisting of C_1-C_4 alkyl, -O-, $-CH_2O-$, $-CO_2-$.

iii.) D is selected from the group consisting of
$-CH_2CH(OH)CH_2O(R^3O)_dR_4$;
$-CH_2CH[O(R^3O)_dR^4]CH_2OH$;
$-CH_2CH(OH)CH_2NR^5(R^3O)_dR^4$;
$-CH_2CH[NR^5(R^3O)_dR^4]CH_2OH$, and mixtures thereof; wherein
R^3 is selected from the group consisting of ethylene, 1,2-propylene, 1,3-propylene, 1,2-butylene, 1,4-butylene, and mixtures thereof;
R^4 is a capping unit selected from the group consisting of H, C_1-C_4 alkyl, C_6-C_{12} aryl and C_7-C_{20} alkylaryl;
R^5 is selected from the group consisting of H, C_1-C_4 alkyl C_6-C_{12} aryl and C_7-C_{20} alkylaryl; and
subscript index d is an integer from 1 to 100.

(ii) graft co-polymers comprising a first moiety derived from monoethylenically unsaturated C_3-C_8 monomers comprising at least one carboxylic acid group, salts of such monomers, and mixtures thereof, said first moieties being grafted onto a C_1-C_4 carbon polyalkylene oxide,

and mixtures thereof; and

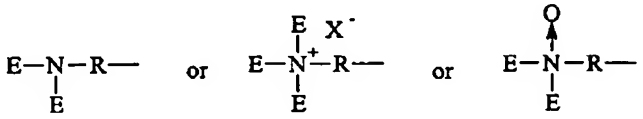
B.) a modified polyamine polymer selected from the group consisting of

(i) modified polyamines having the formulae

$$V_{(n+1)}W_mY_nZ \text{ or } V_{(n-k+1)}W_mY_nY'_kZ$$

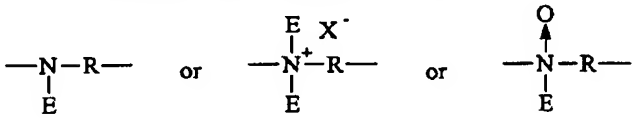
wherein m is an integer from 0 to about 400; n is an integer from 0 to about 400; k is less than or equal to n wherein

a.) V units are terminal units having the formula:



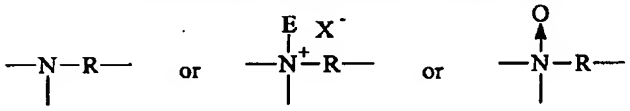
;

b.) W units are backbone units having the formula:



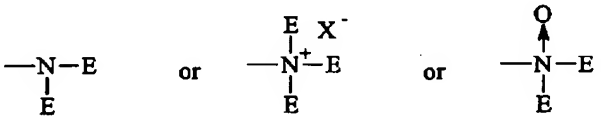
;

c.) Y and Y' units are branching units having the formula:



; and

d.) Z units are terminal units having the formula:



;

wherein:

R units are selected from the group consisting of C_2-C_{12} alkylene, C_4-C_{12} alkenylene, C_3-C_{12} hydroxyalkylene, C_4-C_{12} dihydroxy-alkylene, C_8-C_{12} dialkylarylene, $-(R^1O)_xR^1-$, $-(R^1O)_xR^5(OR^1)_x-$, $-(CH_2CH(OR^2)CH_2O)_z-(R^1O)_yR^1(OCH_2CH(OR^2)CH_2)_w-$, $-C(O)(R^4)_rC(O)-$, $-CH_2CH(OR^2)CH_2-$, and mixtures thereof; wherein

R^1 is C_2-C_3 alkylene and mixtures thereof;

R^2 is hydrogen, $-(R^1O)_xB$, and mixtures thereof;

wherein at least one B is selected from the group consisting of $-(CH_2)_q-SO_3M$, $-(CH_2)_pCO_2M$, $-(CH_2)_q(CHSO_3M)CH_2SO_3M$, $-(CH_2)_q-(CHSO_2M)CH_2SO_3M$, $-(CH_2)_pPO_3M$, $-PO_3M$, and mixtures thereof, and any remaining B moieties are selected from the group consisting of hydrogen, C_1-C_6 alkyl, $-(CH_2)_q-SO_3M$, $-(CH_2)_pCO_2M$, $-(CH_2)_q(CHSO_3M)CH_2SO_3M$, $-(CH_2)_q-$

$(CHSO_2M)CH_2SO_3M$, $-(CH_2)_pPO_3M$, $-PO_3M$, and mixtures thereof;

R^4 is C_1-C_{12} alkylene, C_4-C_{12} alkenylene, C_8-C_{12} arylalkylene, C_6-C_{10} arylene, and mixtures thereof;

R^5 is C_1-C_{12} alkylene, C_3-C_{12} hydroxy-alkylene, C_4-C_{12} dihydroxyalkylene, C_8-C_{12} dialkylarylene, -C(O)-, -$C(O)NHR^6NHC(O)$-, $-R^1(OR^1)$-, $-C(O)(R^4)_zC(O)$-, $-CH_2CH(OH)CH_2$-, $-CH_2CH(OH)CH_2O(R^1O)_yR^1$-$OCH_2CH(OH)CH_2$-, and mixtures thereof;

R^6 is C_2-C_{12} alkylene or C_6-C_{12} arylene;

X is a water soluble anion; provided at least one backbone nitrogen is quaternized or oxidized

E units are selected from the group consisting of hydrogen, C_1-C_{22} alkyl, C_3-C_{22} alkenyl, C_7-C_{22} arylalkyl, C_2-C_{22} hydroxyalkyl, $-(CH_2)_pCO_2M$, $-(CH_2)_qSO_3M$, $-CH(CH_2CO_2M)$-CO_2M, $-(CH_2)_pPO_3M$, $-(R^1O)_xB$, -$C(O)R^3$, and mixtures thereof; provided that when any E unit of a nitrogen is a hydrogen, said nitrogen is not also an N-oxide;

R^1 is C_2-C_3 alkylene and mixtures thereof;

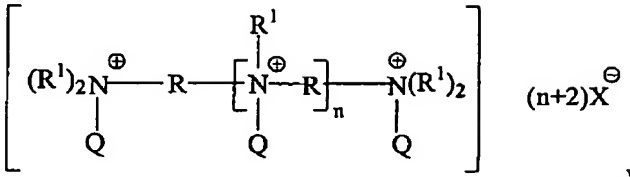
R^3 is C_1-C_{18} alkyl, C_7-C_{12} arylalkyl, C_7-C_{12} alkyl substituted aryl, C_6-C_{12} aryl, and mixtures thereof;

at least one B is selected from the group consisting of $-(CH_2)_q$-SO_3M, $-(CH_2)_pCO_2M$, $-(CH_2)_q(CHSO_3M)CH_2SO_3M$, $-(CH_2)_q$-$(CHSO_2M)CH_2SO_3M$, $-(CH_2)_pPO_3M$, $-PO_3M$, and mixtures thereof, and any remaining B moieties are selected from the group consisting of hydrogen, C_1-C_6 alkyl, $-(CH_2)_q-SO_3M$, $-(CH_2)_pCO_2M$, $-(CH_2)_q(CHSO_3M)CH_2SO_3M$, $-(CH_2)_q$-$(CHSO_2M)CH_2SO_3M$, $-(CH_2)_pPO_3M$, $-PO_3M$, and mixtures thereof;

M is hydrogen or a water soluble cation in sufficient amount to satisfy charge balance; and

wherein the values for the following indices are as follows: subscript index p is an integer from 1 to 6; subscript index q is an integer from 0 to 6; subscript index r has the value of 0 or 1; subscript index w has the value 0 or 1; subscript index x is an integer from 1 to 100; subscript index y is an integer from 0 to 100; and subscript index z has the value 0 or 1.

(ii) modified polyamines having formula (I):



wherein;

a.) R is C_6-C_{20} linear or branched alkylene, and mixtures thereof;

b.) X is an anion present in sufficient amount to provide electronic neutrality;

c.) n and subscript index n have equal values and are integers from 0 to 4;

d.) R^1 is a capped polyalkyleneoxy unit having formula:

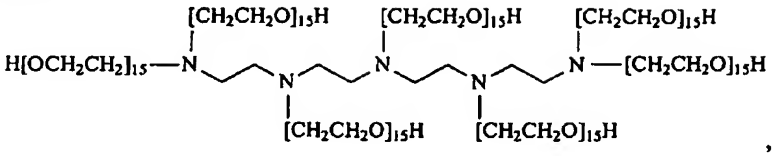
$$-(R^2O)_x-R^3$$

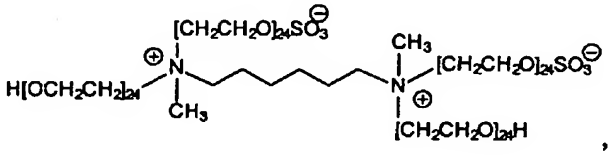
wherein R^2 is C_2-C_4 linear or branched alkylene, and mixtures thereof; subscript index x has a value from about 1 to about 50; at least one R^3 moiety is an anionic capping unit, with the remaining R^3 moieties being selected from the group comprising hydrogen, C_1-C_{22} alkylenearyl, an anionic capping unit, a neutral capping unit, and mixtures thereof;

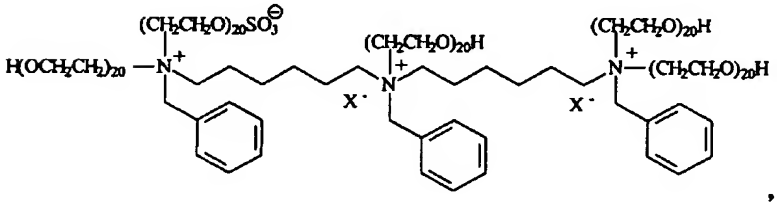
e.) at least one Q moiety, is a hydrophobic quaternizing unit selected from the group comprising C_7-C_{30} substituted or unsubstituted alkylenearyl, and mixtures thereof, any remaining Q moieties are selected from the group comprising lone pairs of electrons on the unreacted nitrogens, hydrogen, C_1-C_{30} substituted or unsubstituted linear or branched alkyl, or C_3-C_{30} substituted or unsubstituted cycloalkyl, and mixtures thereof;

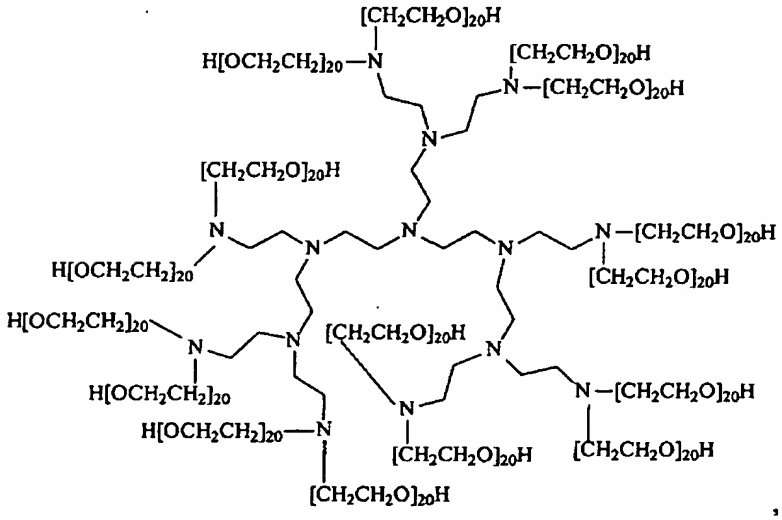
and mixtures thereof.

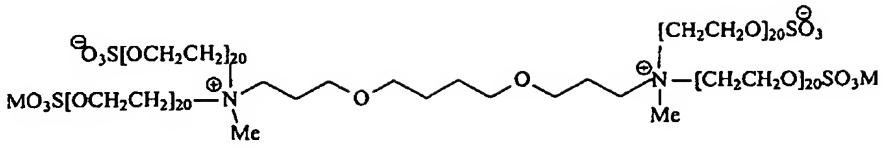
2.) (original) The polymer system of Claim 1 wherein said modified polyamine polymer is selected from the group consisting of polymers having the following formulae:











and mixtures thereof.

3.) (original) A cleaning composition comprising the polymer system of Claim 1

4.) (cancelled)